generation is controlled corresponding to operation of the timer circuit 181 and thereby the high voltage pulse is no longer applied, the timer circuit 171 stops operation and the reset pulse is outputted from the timer circuit 171 (Fig. 19(k)). As explained above, the reset pulse is outputted from the timer circuit 171, but since a signal obtained by inverting the output signal of the pulse duration measuring circuit 175 with the inverter 185 is inputted to the AND gate 186, the output of the AND gate 186 is maintained at the low level.

Therefore, the OR gate 184 passes the reset pulse outputted from the timer circuit 181. The reset pulse outputted from the timer circuit 181 is then inputted to the pulse duration measuring circuit 175 and the pulse counting circuit 173 to reset the accumulated period data and pulse counter number.

As explained above, when the accumulated period is 50 msec or less, the timer circuit 171 generates the reset pulse. When the accumulated period is 50 msec or more, the timer circuit 181 generates the reset pulse. Thereby, the number of timer circuits may be reduced to realize reduction in size of the circuit.

When the output signal of the output control circuit 182 is low level, power generation is stopped. It is also possible to realize the duty-control of the on/off conditions of the power transistor 61 by repeating the Low and high levels.

Moreover, it is also possible to use a gradual oscillation circuit for gradually increasing a duty ratio as the timer circuit 181 and output control circuit 182. The timer circuit

181 may be eliminated under the condition that a duty ratio preset with the gradual oscillation circuit is lowered to the predetermined value when the output of the pulse duration measuring circuit 175 rises and the predetermined duty ratio can be increased gradually. Generation of a high voltage pulse can be controlled effectively by gradually increasing the duty ratio. Since increase of power generation torque of the alternator can be controlled, a torque shock after re-start of power generation can be controlled. In addition, a counter, a capacitor, a resistor, a constant voltage circuit or the like forming the timer circuit 181 may be eliminated by deleting the timer circuit 181 and thereby an IC forming the voltage regulator can be reduced in size.

[Fifth Embodiment]

Next, an alternator 1 for a vehicle according to a fifth embodiment will be explained.

Fig. 20 shows a charging system using the alternator 1 for of this embodiment. Unlike each embodiment explained above, this embodiment uses software to process a high voltage pulse detecting signal.

The alternator 1 is provided with an armature winding 3, a full-wave rectifier 4, a field winding 5 and a voltage regulator 6. This voltage regulator 6 is provided with a field current control circuit 86, an output voltage control circuit 77 and an FR signal output circuit 13.

The field current control circuit 86 includes a power transistor 61 and a flywheel diode 62 to control the field current

flowing through the field winding 5. The power transistor 61 is connected at the base to the output terminal of the output voltage control circuit 77. It turns on when the signal inputted from this output terminal is in the high level. In this timing, the current flowing into the field winding 5 increases. The flywheel diode 62 is connected in parallel with the field winding 5 and flywheels the field current when power feeding to the field winding 5 is controlled to off condition.

The output voltage control circuit 77 sets the first regulated voltage (for example, 14.5V) when the signal inputted to the terminal C is high level and the second regulated voltage (for example, 12.8V) when the signal is low level to execute the on/off control of the power transistor 61.

The FR signal output circuit 13 outputs from the terminal FR a signal depending on the voltage waveform appearing at the connecting point F of the power transistor 61 and the flywheel diode 62.

The terminals C and FR of the voltage regulator 6 are connected to an external controller 9. This external controller 9 comprises an input circuit 90, an output circuit 91, CPU 92 and a memory 93. The predetermined process when a high voltage pulse is impressed to the alternator 1 is carried out by executing the predetermined program stored in the memory 93 with the CPU 92.

The signal outputted from the terminal FR of the voltage regulator 6 is inputted to the input circuit 90, and the predetermined process is executed with the CPU 92. Thereafter,